

department store chains will provide auto repair services in large shops that employ many technicians to do after-warranty repairs, such as oil changes, brake repair, air conditioner service, and other minor repairs, taking less than 4 hours to complete. Employment of automotive mechanics and service technicians in gasoline service stations will continue to decline, as few stations offer repair services.

The number of automotive mechanics and service technicians will increase, due to the expansion of the driving age population and the number of households with multiple motor vehicles. The growing complexity of automotive technology necessitates that cars be serviced by skilled workers, contributing to the growth in demand for highly trained mechanics and technicians.

More job openings for automotive mechanics and service technicians are expected than for most other occupations, as experienced workers transfer to related occupations, retire, or stop working for other reasons. This large occupation needs a substantial number of entrants each year, to replace the workers who leave the occupation.

Most persons who enter the occupation can expect steady work, because changes in economic conditions have little effect on the automotive repair business. During a downturn, however, some employers may be more reluctant to hire inexperienced workers.

Earnings

Median hourly earnings of automotive mechanics and service technicians, including commission, were \$13.16 in 1998. The middle 50 percent earned between \$10.02 and \$17.14 an hour. The lowest 10 percent earned less than \$7.44 and the highest 10 percent earned more than \$21.25 an hour. Median annual earnings in the industries employing the largest number of automotive mechanics and service technicians in 1997 were as follows:

Local government, except education and hospitals	\$15.19
New and used car dealers	15.03
Automotive repair shops	11.86
Auto and home supply stores	11.31
Gasoline service stations	11.18

Many experienced technicians employed by automotive dealers and independent repair shops receive a commission related to the labor cost charged to the customer. Under this method, weekly earnings depend on the amount of work completed. Employers frequently guarantee commissioned mechanics and technicians a minimum weekly salary. Many master technicians earn from \$70,000 to \$100,000 annually.

Some automotive service technicians are members of labor unions such as the International Association of Machinists and Aerospace Workers; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; the Sheet Metal Workers' International Association; and the International Brotherhood of Teamsters.

Related Occupations

Other workers who repair and service motor vehicles include diesel mechanics and service technicians, automotive body repairers, customizers, repair service estimators, and motorcycle, boat, and small-engine mechanics.

Sources of Additional Information

For more details about work opportunities, contact local automotive dealers and repair shops or the local office of the State employment service. The State employment service also may have information about training programs.

A list of certified automotive technician training programs can be obtained from:

☛ National Automotive Technicians Education Foundation, 13505 Dulles Technology Dr., Herndon, VA 20171-3421.

Internet: <http://www.natef.org>

For a directory of accredited private trade and technical schools that offer programs in automotive technician training, write:

☛ Accrediting Commission of Career Schools and Colleges of Technology, 2101 Wilson Blvd., Suite 302, Arlington, VA 22201.

For a list of public automotive technician training programs, contact:

☛ SkillsUSA-VICA, P.O. Box 3000, 1401 James Monroe Hwy., Leesburg, VA 22075. Telephone (toll free): 1-800-321-VICA.

Internet: <http://www.skillsusa.org>

Information on automobile manufacturer-sponsored 2-year associate degree programs in automotive service technology can be obtained from:

☛ Ford ASSET Program, Ford Customer Service Division, Fairlane Business Park III, 1555 Fairlane Dr., Allen Park, MI 48101. Telephone (toll free): 1-800-272-7218.

☛ Chrysler Corporation, National C.A.P. Coordinator, National Technical Training Center, 2367 Walton Blvd., Auburn Hills, MI 48326. Telephone (toll free): 1-800-626-1523.

Internet: <http://www.CAP.chryslercorp.com>

☛ General Motors Automotive Service Educational Program, National College Coordinator, General Motors Service Technology Group, MC 480-204-001, 30501 Van Dyke Ave., Warren, MI 48090. Telephone (toll free): 1-800-828-6860.

☛ Toyota-Technical Education Network (T-TEN), P.O. Box 4900, Fenton, MO 63026-9842. Telephone (toll free): 1-800-441-5141.

Internet: <http://www.t-ten.com>

Information on how to become a certified automotive service technician is available from:

☛ ASE, 13505 Dulles Technology Dr., Herndon, VA 20171-3421.

Internet: <http://www.asecert.org>

For general information about the work of automotive mechanics and service technicians, write:

☛ Automotive Service Association, Inc., 1901 Airport Freeway, Bedford, TX 76021-5732. Internet: <http://www.asashop.org>

☛ Automotive Service Industry Association, 25 Northwest Point, Elk Grove Village, IL 60007-1035

☛ National Automobile Dealers Association, 8400 Westpark Dr., McLean, VA 22102

Coin, Vending, and Amusement Machine Servicers and Repairers

(O*NET 85947)

Significant Points

- Most workers learn their skills on the job.
- Opportunities should be good for persons with some knowledge of electronics.

Nature of the Work

Coin, vending, and amusement machines are a familiar sight in offices, convenience stores, arcades, and casinos. These coin-operated machines dispense refreshments, test our senses, and spit out lottery tickets nearly everywhere we turn. Coin, vending, and amusement machine servicers and repairers install, service, and stock these machines and keep them in good working order.

Vending machine servicers, often called route drivers, visit coin-operated machines that dispense soft drinks, candy and snacks, and other items. They collect money from the machines, restock merchandise, and change labels to indicate new selections. They also keep the machines clean and appealing.

Vending machine repairers, often called mechanics or technicians, make sure machines operate correctly. When checking complicated electrical and electronic machines, such as beverage dispensers, they make sure that the machines mix drinks properly and that refrigeration and heating units work correctly. On the relatively simple gravity-operated machines, servicers check handles, springs, plungers, and merchandise chutes. They also test coin and change-making mechanisms.

When installing machines, vending machine repairers make the necessary water and electrical connections and check the machines for proper operation. They also make sure installation complies with local plumbing and electrical codes. Because many vending machines

dispense food, these workers must comply with State and local public health and sanitation standards.

Amusement machine servicers and repairers work on juke boxes, video games, pinball machines, and slot machines. They make sure the various levers, joysticks, and mechanisms function properly, so that the games remain fair and the juke box selections are accurate. They update selections, repair or replace malfunctioning parts, and rebuild existing equipment. Those who work in the gaming industry must adhere to strict guidelines, because State and Federal agencies regulate many gaming machines.

Preventive maintenance—avoiding trouble before it starts—is a major job of repairers. For example, they periodically clean refrigeration condensers, lubricate mechanical parts, and adjust machines to perform properly.

If a machine breaks down, vending and amusement machine repairers inspect it for obvious problems, such as loose electrical wires, malfunctions of the coin mechanism, and leaks. When servicing electronic machines, repairers test them with hand held diagnostic computers that determine the extent and location of any problem. Repairers may only have to replace a circuit board or other component to fix the problem. However, if the problem cannot be readily located, these workers refer to technical manuals and wiring diagrams and use testing devices, such as electrical circuit testers to find defective parts. Repairers decide if they must replace a part and whether they can fix the malfunction on-site or if they have to send the machine to the repair shop.

In the repair shop, vending and amusement machine repairers use power tools, such as grinding wheels, saws, and drills, as well as voltmeters, ohmmeters, oscilloscopes, and other testing equipment. They also use ordinary repair tools, such as screwdrivers, pliers, and wrenches.

Vending machine servicers and repairers employed by small companies may both fill and fix machines on a regular basis. These combination servicers-repairers stock machines, collect money, fill coin and currency changers, and repair machines when necessary.

Servicers and repairers also do some paper work, such as filing reports, preparing repair cost estimates, ordering parts, and keeping daily records of merchandise distributed. However, new machines with computerized inventory controls reduce the paperwork a servicer must complete.

Working Conditions

Some vending and amusement machine repairers work primarily in company repair shops, but many spend substantial time on the road visiting machines wherever they have been placed. Vending and amusement machines operate around the clock, so repairers often work at night and on weekends and holidays.



Coin, vending, and amusement machine servicers and repairers check handles, springs, plungers, and merchandise chutes on simple gravity-operated machines.

Vending and amusement machine repair shops generally are quiet, well lighted, and have adequate work space. However, when servicing machines on location, the work may be done where pedestrian traffic is heavy, such as in busy supermarkets, industrial complexes, offices, casinos, or arcades. Repair work is relatively safe, although servicers and repairers must take care to avoid hazards such as electrical shocks and cuts from sharp tools and other metal objects. They also must follow safe work procedures, especially when moving heavy vending and amusement machines.

Employment

Coin, vending, and amusement machine servicers and repairers held about 27,000 jobs in 1998. Most repairers work for vending companies that sell food and other items through machines. Others work for soft drink bottling companies that have their own coin-operated machines. A growing number of servicers and repairers work for amusement establishments that own video games, pin-ball machines, juke boxes, slot machines, and similar types of amusement equipment. Although vending and amusement machine servicers and repairers are employed throughout the country, most are located in areas with large populations and many vending and amusement machines.

Training, Other Qualifications, and Advancement

Employers normally prefer to hire high school graduates. New workers are trained to fill and fix machines informally on the job by observing, working with, and receiving instruction from experienced repairers. High school or vocational school courses in electricity, refrigeration, and machine repair are an advantage in qualifying for entry level jobs. Employers usually require applicants to demonstrate mechanical ability, either through work experience or by scoring well on mechanical aptitude tests.

Because coin, vending, and amusement machine servicers and repairers sometimes handle thousands of dollars in merchandise and cash, employers hire persons who have a record of honesty. The ability to deal tactfully with people also is important. A commercial driver's license and a good driving record are essential for most vending and amusement machine servicer and repairer jobs. Some employers require their servicers to be bonded.

As electronics become more prevalent in vending and amusement machines, employers will increasingly prefer applicants who have some training in electronics. Technologically advanced machines with features such as multilevel pricing, inventory control, and scrolling messages extensively use electronics and microchip computers. Some vocational high schools and junior colleges offer 1- to 2-year training programs in basic electronics.

Beginners start training with simple jobs, such as cleaning or stocking machines. They then learn to rebuild machines, by removing defective parts, repairing, adjusting, and testing the machines. Next, they accompany an experienced repairer on service calls, and finally make visits on their own. This learning process takes from 6 months to 3 years, depending on the individual's abilities, previous education, types of machines serviced, and the quality of instruction.

The National Automatic Merchandising Association has a self-study mechanics training program for vending machine repairers. Repairers use manuals for instruction in subjects such as customer relations, safety, electronics, and schematic reading. Upon completion of the program, repairers must pass a written test, to become certified as a journey or master mechanic.

To learn about new machines, repairers and servicers sometimes attend training sessions sponsored by manufacturers that may last from a few days to several weeks. Both trainees and experienced workers sometimes take evening courses in basic electricity, electronics, microwave ovens, refrigeration, and other related subjects to stay on top of new techniques and equipment. Skilled servicers and repairers may be promoted to supervisory jobs or go into business for themselves.

Job Outlook

Employment of coin, vending, and amusement machine servicers and repairers is expected to grow about as fast as the average for all occupations through the year 2008, because of the increasing number of vending and amusement machines in operation.

Establishments are likely to install additional vending machines in industrial plants, hospitals, stores, and other business establishments, to meet the public demand for inexpensive snacks and other food items. The range of products dispensed by machine is expected to increase, as vending machines continue to become increasingly automated and machines are built that include microwave ovens, mini-refrigerators, and freezers. In addition, casinos, arcades, and other amusement establishments are an increasing source of entertainment for baby boomers and young adults. Also, State and multi-State lotteries are increasingly using coin-operated machines, to sell scratch-off tickets in grocery stores and other public places.

Improved technology in newer machines will moderate employment growth, because these machines require maintenance less frequently than older ones. These new machines will need repairing and restocking less often, and contain computers that record sales and inventory data, reducing the amount of time-consuming paperwork. Additionally, some new machines use wireless data transmitters to signal the vending machine company, when these machines need restocking or repairing. This allows servicers and repairers to be dispatched only when needed, instead of their having to check each machine on a regular schedule.

Experienced workers who transfer to other occupations or leave the labor force will create job openings. Persons with some background in electronics should have good job prospects, because electronic circuitry is an important component of vending and amusement machines. If firms cannot find trained or experienced workers for these jobs, they are likely to train qualified route drivers or hire inexperienced people who have acquired some mechanical, electrical, or electronic training by taking high school or vocational courses.

Earnings

Median hourly earnings of coin, vending, and amusement machine servicers and repairers were \$11.18 in 1998. The middle 50 percent earned between \$8.73 and \$13.83 an hour. The lowest 10 percent earned less than \$6.80 and the highest 10 percent earned more than \$16.56 an hour. Typically, States with some form of legalized gaming have the highest wages.

Most coin, vending, and amusement machine servicers and repairers work 8 hours a day, 5 days a week and receive premium pay for overtime. Some union contracts stipulate higher pay for night work and for emergency repair jobs on weekends and holidays than for regular hours. Some vending machine repairers and servicers are members of the International Brotherhood of Teamsters.

Related Occupations

Other workers who repair equipment with electrical and electronic components include home appliance and power tool repairers, electronic equipment repairers, and general maintenance mechanics.

Sources of Additional Information

Information on job opportunities in this field can be obtained from local vending machine firms and local offices of your State employment service. For general information on vending machine repair, write to:

☛ National Automatic Merchandising Association, 20 N. Wacker Dr., Suite 3500, Chicago, IL 60606-3102.

Internet: <http://www.vending.org>

☛ American Vending Sales, Inc., 750 Morse Ave., Elk Grove Village, IL 60007.

Diesel Mechanics and Service Technicians

(O*NET 85311A)

Significant Points

- A career as a diesel mechanic or service technician offers relatively high wages and the challenge of skilled repair work.
- Opportunities are expected to be good for persons who complete formal training programs.
- National certification is the recognized standard of achievement for diesel mechanics and service technicians.

Nature of the Work

The diesel engine is the workhorse powering the Nation's heavy vehicles and equipment, because it delivers more power per unit of fuel and is more durable than its gasoline-burning counterpart.

Diesel mechanics and service technicians repair and maintain the diesel engines that power transportation equipment, such as heavy trucks, buses, and locomotives. Some diesel mechanics and technicians also work on bulldozers, cranes, road graders, farm tractors, and combines; and a small number repair automobiles or boats. (For information on mechanics and technicians working primarily on automobiles, heavy equipment, or boats, see the *Handbook* statements on automotive, mobile heavy equipment, or motorcycle, boat, and small-engine mechanics.)

Mechanics and technicians who work for organizations that maintain their own vehicles spend most of their time doing preventive maintenance, to ensure that equipment can be operated safely. These workers also eliminate unnecessary wear and damage to parts that could result in costly breakdowns. During a routine maintenance check on a vehicle, technicians follow a checklist that includes the inspection of brake systems, steering mechanisms, wheel bearings, and other important parts. Following an inspection, technicians usually repair or adjust parts that do not work properly and replace parts that cannot be fixed.

In many shops, it is common for workers to do all kinds of repairs. Jobs can vary from working on a vehicle's electrical system one day, to doing major engine repairs the next. In some large shops, technicians specialize in one or two types of work. For example, a shop may have technicians specializing in major engine repair, transmission work, electrical systems, suspension, or brake systems. Diesel maintenance is becoming increasingly complex, as more electronic components are used to control engine operation. In modern shops, diesel mechanics and service technicians use handheld computers to diagnose problems and to adjust engine functions.

Diesel mechanics and service technicians use a variety of tools in their work, including power tools, such as pneumatic wrenches to remove bolts quickly; machine tools, like lathes and grinding machines to rebuild brakes; welding and flame-cutting equipment to remove and repair exhaust systems; and jacks and hoists to lift and move large parts. Common handtools—screwdrivers, pliers, and wrenches—are used to work on small parts and get at hard-to-reach places. Diesel mechanics and service technicians also use a variety of computerized testing equipment to pinpoint and analyze malfunctions in electrical systems and engines.

In large shops, technicians generally receive their assignments from shop supervisors or service managers. Most supervisors and managers are experienced technicians who also assist in diagnosing problems and maintaining quality standards. Technicians may work as a team or be assisted by an apprentice or helper, when doing heavy work, such as removing engines and transmissions.